United States
Consumer Product Safety Commission

Investigation on Racial and Socioeconomic Differences: Race, Ethnicity, and Socioeconomic Data in Consumer Product Safety

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This report was prepared by the CPSC staff. It has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

Table of Contents

Executive Summary

The U.S. Consumer Product Safety Commission (CPSC, or Commission) is an independent government agency created under the Consumer Product Safety Act (CPSA). The agency is charged with protecting the public against unreasonable risks of injury or death from consumer products through education, safety standards activities, regulation, and enforcement. CPSC staff identifies hazard patterns in the products within its jurisdiction, develops and communicates safety standards, and issues recalls. The CPSC has established mandatory standards for a variety of products and billions of units sold, including children's toys and household items, except certain products excluded by statute, for example, motor vehicles, tobacco, food, drugs, cosmetics, most medical devices, and pesticides.

Beginning in fiscal year 2021, (FY 2021), CPSC staff from the Office of Hazard Identification and Reduction (EXHR) began methodologically including characterizations of racial and ethnic dimensions in annual CPSC Epidemiological reports where data elements were available. The CPSC reports provide descriptive analyses on a series of topics. Injury estimates and fatalities of similar products and diagnoses codes are analyzed highlighting meaningful differences in hazard patterns among population groups. The key findings include:

Carbon Monoxide (CO)

- For CO estimates, the percentage of other emergency department (EDT) related CO fatalities identified as non-Hispanic White (87 percent of deaths) is much higher than the proportion classified as non-Hispanic White.

CO Poisoning from Generators and Engine-Driven Tools

- For CO fatalities related to generators and engine driven tools, the percentage of all EDT-related CO fatalities identified as non-Hispanic Black or African American (21 percent of deaths) is a much higher proportion than those classified as non-Hispanic Black or African Americans in the U.S. population.

- For CO fatalities related to generators, the percentage of non-Hispanic Black or African American victims is even higher (12 percent of deaths), nearly double the population

- Additionally, the percentage of the other EDT-related CO fatalities identified as non-Hispanic White (87 percent of deaths) is much higher than the proportion classified as non-Hispanic Whites.

Drownings

- For nonfatal drowning injuries where race is known, 19 percent Blacks or African Americans 15 years of age and represent a higher percent than the proportion of the U.S. Black or African American population for that age.

Fireworks

- There are proportionately more non-Hispanic Black or African American victims (21.5 percent of victims), proportionately fewer victims associated with an "Other" race (7.6 percent of victims) and fewer non-Hispanic White EDT-related victims (70.9 percent of victims)

Furniture and Television Instability

- Of the patients categorized, proportionately more non-Hispanic White children injured (64 % of injuries compared to the non-Hispanic White population); proportionately more non-Hispanic White seniors injured (86 % of injuries compared to the proportion of the non-Hispanic White senior population.

- Compared to the proportion of the U.S. population categorized as Black or African American, there are proportionately more Black or African American children injured (18 percent of injuries); and proportionately more Black or African American adults injured (35 percent of injuries).

Micromobility

- The proportion of estimated injuries sustained by non-Hispanic Blacks or African Americans is disproportionately high, compared to the proportion of Blacks or African Americans in the general U.S. population for overall micromobility (31 percent of victims) and (37 percent for e-scooters).

Residential Fires

- The U.S. Fire Administration's, National Fire Incident Reporting System, and the National Fire Protection Association's Survey of Fire Departments for U.S. Fire Experience data estimated per capita fire death rate of Blacks or African Americans, 1.3 per hundred thousand, is nearly twice the overall rate. The

estimated rate of injuries per person for Blacks or African Americans (5.7 per hundred thousand), and for Other – including multi-racial (4.9 per hundred thousand) are much higher than the overall rate (2.8 per hundred thousand).

The Commission, in its fiscal year 2022 (FY 2022) Operating Plan, added funds for contract work, as well as Milestone 19 "Reported on Investigation on Racial and Socioeconomic Differences," to capture staff activities in this area. Additionally, staff from EXHR have collaborated with the CPSC Office of Communications to develop and deliver targeted messaging in consumer safety.

The CPSC has taken steps toward implementing the processes identified in FY 2021 to:

1. Enhance agency data collection and analysis of product safety incidents, injuries, and deaths, to identify vulnerable populations that exist, by using identifiers, including, but not limited to, race, age, gender, location, or socioeconomic status;
2. Allocate safety work to address any existing safety disparities among such identified vulnerable populations; and
3. Augment safety messaging to target newly identified vulnerable populations to address applicable safety issues.

On January 20, 2021, the President issued Executive Order (EO) 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*. The purpose of this executive order is to "pursue a comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality." The CPSC is committed to meeting the requirements of EO 13985.

EXHR staff and EXHR and others execute these efforts through collection and analysis of data to identify hazards and hazard patterns and to evaluate the risks associated with consumer products. The CPSC receives thousands of reports of consumer product incidents per year, collecting data and generating analytics for product safety evaluation through the Consumer Product Safety Risk Management System (CPSRMS). The data collected by the CPSC include the National Electronic Injury Surveillance System (NEISS), death certificates, SaferProducts.gov reports, In-Depth Investigation Files, news clippings, and the Injury and Potential Injury Incident Database.

This report focuses on data and analysis, which are the cornerstones of CPSC's efforts to advance safety. It describes agency efforts and integrates insights from the various CPSC epidemiological studies. It also describes the current CPSC data systems and discusses the challenges in data collection and analysis, while providing recommendations for enhancing the availability and the use of population data,

specifically, race, ethnicity, and socioeconomic indicators. The report then transitions to the status of the CPSC's data imputation study, which seeks to use statistical methods to fill in missing demographic data. It illustrates how data are an asset and the importance of collaboration, coordinated action, and communication.

Introduction

Consumer product safety issues are public health issues. Consumer product safety is a complex concept involving interrelationships with multiple disciplines. Research indicates that a confluence of factors, including determinants of health encountered over a lifespan, influence individual and population health and safety. The World Health Organization describes determinants of health as conditions in which people are born, grow, live, and age, and the vast set of forces and systems often shaping conditions of daily life. These determinants are key to influencing how to address health and safety issues. Evidence-based interventions are most often effective when there is a strategic assessment, planning, and analysis, looking at a broader view of the larger context of populations and communities and an understanding of what often causes conditions making individuals, populations, and communities more susceptible to vulnerable circumstances. There should be a recognition of the variability of living circumstances and how developmental and conditions can change over time in society, within populations, and at an individual level.

Conceptual Public Health Framework Model

Injury prevention researchers and practitioners have a responsibility to ensure injury prevention models consider the needs of the entirety of the population. Models are conceived to help organize thinking, identify opportunities for intervention, and to evaluate if interventions are having the desired outcome (Krieger,1994). Injury control programs develop from an understanding of both the frequency in which events occur (through monitoring), but also the risk factors behind their occurrence, including social determinants of health, mitigation, and interventions (Moore M., et al., 2019).

What Are Social Determinants of Health?

Social determinants of health is a relatively new term in public health. As defined by the U.S. Department of Health and Human Services (US HHS), "social determinants of health" are "the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes." As non-medical factors or covariates, they play a significant role in our health and safety (Braveman, et al., 2011). Social determinants are shaped by

distributions of money, power, and resources at global, national and community levels. The U.S. HHS Healthy People Initiative divides social determinants of health into five core domains: Economic Stability, Education, Health and Health Care, Neighborhood and Built Environment, and Social and Community Context.

Table 1: 5 Domains of the Social Determinants of Health*

Economic Stability	Education	Social and Community Context	Health and Health Care	Neighborhood and Built Environment
Employment, Food insecurity, Housing instability, Poverty	Early childhood education and development, Enrollment in higher education, High school graduation, Language and literacy	Civic participation, Discrimination, Social cohesion, Conditions in the workplace	Access to healthcare, Proximity to a trauma center, Access to primary care, Health literacy	Access to foods that support healthy eating patterns, Crime and violence, Environmental conditions, Quality of housing

* https://health.gov/healthypeople/priority-areas/social-determinants-health

These domains, which can be either risk or protective factors, are key to determining how to address community health and safety issues and influence disparities in consumer product injuries and fatalities. As seen in Table 1 of this report, each domain has specific determinants identified as risk factors. The greater the number of risk factors, the greater the chances of adverse outcomes over a lifespan. For a decade, the Centers for Disease Control and Prevention (CDC) generated and funded research and tools to address social determinants of health, facilitating cross-agency coordination of federal programs, community organizations, research organizations, and health care systems, and serving as a step to health equity. The CDC is now funding social determinants of health accelerator grants. Health accelerator grants is federal funding awarded to state, local, tribal, or territorial jurisdictions to accelerate the adoption of proven public health strategies that reduce the burden of chronic disease among people experiencing health disparities and inequities (Social Determinants of Health Accelerator Plans, CDC, 2021)

Although these definitions can be inextricably connected to one another, distinguishing between them increases understanding of the complexity of the problem. Health equity researchers, Jacob C. Warren, Behavioral Epidemiologist, and K. Bryan Smalley,

Licensed Clinical Psychologist (2021), in Health Equity: A Solutions-Focused Approach, Health Equity Frameworks and Theories, emphasize cautionary guidance of how to approach social determinates of health:

> For instance, it is well known that education level is strongly correlated with employability, and that members of racial and ethnic minority groups are less likely to receive higher education degrees. It is easy to (incorrectly) conclude that the differences seen in employment rates are explained by differences in education attainment. A more detailed look at Bureau of Labor Statistics data, however, reveals that to be far from the case. Historically, African Americans face higher unemployment rate than all other race and/or ethnic groups even at each level of education. The unemployment rate for Whites with only a high school diploma is lower than the unemployment rate for African Americans at all but the highest level of education. The effects of discrimination and other societal barriers to employment thus extend well beyond the effort of any individual social determinate of health such as education level. This is not to say that increasing opportunities for all adults, with emphasis on race-based populations, to achieve higher education goals is not important. It is just to illustrate that the role that social determinants play in health disparities and health equity should not be oversimplified. (pg. 41)

Addressing social determinants of health involves an examination of historical and current laws, practices, societal structures, and systems of power. It involves public health and medical care, yet it extends beyond. It requires collaboration with multiple sectors outside of health, including education, housing, labor, justice, transportation, agriculture, and the environment.

Health equity is a principle or goal that drives efforts to eliminate disparities in health among populations. Health disparities are the metric by which we measure progress toward health equity. Often, unclear terms can make precise understanding and analysis even harder. Health equity is not the same as health disparity, and the differences are not trivial. Table 2 outlines distinctions between health equity and related terms:

Table 2: Definition of Common Terms

Health disparities	Differences in health and well-being outcomes without an identified cause among groups of people. (HHS Healthy People Definition) Differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States (NIH Definition)
Health care disparities	Differences in quality of health care received that are not due to access-related factors or clinical needs, preferences, or appropriateness of interventions. (Healthy People Definition) Difference in treatment provided to members of different racial (or ethnic) groups that is not justified by the underlying health conditions or treatment preferences of patients (Institute of Medicine Definition)
Health inequalities	Differences in health status, or in the distribution of health determinants among different population groups (e.g., differences in mobility between older and younger populations or in mortality rates among people from different social classes).
Health inequities	Differences in health and well-being outcomes that are avoidable, unfair, and unjust. Health inequities are affected by social, economic, and environmental conditions.

Health equity is the realization of the highest attainable level of health by all people. It requires equally valuing all individuals and populations. There is also an obligation to address the burdens of injury and hazard patterns within populations, which contributes to health equity work. The CDC's Injury Center's Division of Injury Prevention conducted a meta-analysis and systemic review on "Health equity guiding frameworks and indices in injury" and included articles and health equity guiding frameworks and indices sourced from previous knowledge of the literature (Lennon, N.H. et al., 2022).

Populations

A population is a distinct group of individuals with shared identity and characteristics. In statistics, a population is a pool of individuals from which a statistical sample is drawn from a study. Any selection of individuals grouped by a common feature can be identified as a population. A population can also be a "sample population," referring to a statistically significant portion of a population, not an entire population. For this reason, a statistical analysis of a sample should report the appropriate standard deviation or

standard error, also referred to as a margin of error, of its results from the entire population. This is standard practice in epidemiological reporting.

There can be continuums of change of racial or ethnic identity at both the individual and the community (group) level. According to the 2020 U.S. Census, the most prevalent racial or ethnic group in the United States remains White alone, non-Hispanic population (204.3 million) at 57.8 percent. This is a decrease from the 2010 U.S. Census. The second-largest racial or ethnic group in most United States Census-tract counties, Hispanic population (62.1 million) comprises 18.7 percent of the total population. Black or African American alone, non-Hispanic population (41.1 million) is the third largest group at 12.1 percent of the total population.

The 2020 U.S. Census reports that the prevalence of the Black or African American alone, non-Hispanic population is similar in demographics compared to the 2010 U.S. Census. When combined with the 5.8 million who identified as Black or African American in combination with another race group, such as White or American Indian and Alaska Native, the Black or African American alone, or in combination population (46.9 million), increases the population to 14.2 percent. The next largest racial populations are the Asian alone, or in combination (24 million), the American Indian and Alaska Native alone, or in combination group (9.7 million), and the Native Hawaiian and Other Pacific Islander alone, or in combination group (1.6 million). The U.S. Census 2020 shows 8.4 percent of all respondents self-identified as Some Other Race alone in 2020, an increase from 6.2 percent during the 2010 U.S. Census. Also, representing 10 percent of the population, the number of people who identified as two or more races more than tripled from 9 million people in 2010 (10 years after selection of multiple races was allowed), to 33.8 million in 2020.

Vulnerable Populations

Vulnerable populations are a group of people at higher risk of health disparities by virtue of their race and ethnicity, socio-economic status, geography, sex or gender, age, and disability status. The overall well-being of vulnerable populations is closely intertwined with the overall health and resources of the general population of the United States. The term vulnerable populations is often used interchangeably with the term underserved populations. Although undeserved consumers have limited access to services, vulnerable consumers can experience additional barriers. Consumers can fall into both categories. There is an increased recognition of disparities in health experienced by individuals with disabilities when compared to those without disabilities, including those with intellectual and developmental disabilities (Shi, X. et al., 2015). EXHR contracted a study, "Consumers with Intellectual and Developmental Disabilities: Review Investigating Safety Behaviors, Perspectives and Attitudes." Findings from the

literature review reveal that individuals with intellectual and developmental disabilities (IDDs) experience a life expectancy that is about 20 years lower than the general population, and they experience mortality rates that are approximately 10 percent to 50 percent greater than the general population. The study also noted research pertaining to safety for consumers with disabilities. EXHR intends to conduct additional research and identify ways to decrease risk of injury and death of IDDs and other vulnerable populations.

The social dimensions of vulnerability involve the ability of individuals, groups, organizations, or societies to withstand impacts. Physical characteristics of homes, transportation infrastructure, and urban and rural environments can constitute hazards and sources of risk, at varying levels, interacting with human vulnerabilities. These factors often result in substantial inequities in the incidence and impact of injuries with more impoverished socially disadvantaged communities bearing a disproportionately high burden (Ameratunga & Hosking, 2012).

There is an opportunity to examine the interrelationship of consumer safety, especially with community-based injury prevention programs, and social determinants of health. For social determinants of health data, there is a need for the continued development of a set of standard tools, processes, and models in data collection and analysis. Nationwide, many social determinants of health data frameworks and methods have been proposed, developed, and are being implemented. Currently, there are efforts capturing social determinants of health domains in electronic health records. To identify social determinants of health affecting individuals and populations, some healthcare settings have systemized the collection of social determinants of health data by using standardized social screening questionnaires, including those endorsed by organizations such as the National Academy of Medicine, the National Associations of Community Health Centers, and the Centers for Medicare and Medicaid Innovation (Moen et al., 2020). By employing the right data in the right context, systems that aim to increase capacity to interpret and apply social determinants of health data can bring diverse perspectives to the explanation of hazard patterns and trends and more creativity to the design of consumer safety interventions (Gottlieb, L.M. et al., 2018).

Socioeconomic Factors

Socioeconomic factors can include education levels, employment, and income of a population. They are a component of the social determinants of health domain (See Table 1). Socioeconomic factors can be predictors of injury and fatality incidences. While studies report higher injury rates among lower-income populations, the results can vary based on injury type and mechanism and the specific socioeconomic exposure (Giles et al., 2020).

Research showing a connection between poverty and elevated fire risk has been documented in multiple studies as far back as the late 1970s and early 1980s (Jennings, C.R., 1999). An example of the collision of social determinants of health and socioeconomics is illustrated by the narrative below from the National Fire Protection Association's Poverty and the Risk of Fire Report (https://nfpa.access.preservica.com/):

> After the power had been shut off in their manufactured home, a family had been using candles for light. Three 20-lb propane cylinders and four oxygen cylinders were stored inside the structure. On returning home after midnight from an out-of-town trip the family consisting of a couple and their four young grandchildren, went to bed, leaving a lantern burning in the kitchen under a table. A short time later, a neighbor heard an explosion and discovered the house in flames. The home was destroyed in the explosion and fire and all members of the family were killed (Fahy and Maheshwari, 2021, pg. 3).

CPSC cannot directly impact the socioeconomic challenges faced by consumers although understanding risks and challenges of the U.S. consumer can help CPSC gain insight into opportunities for risk mitigation and reduction strategies.

Race Indicators

For current federal data collection, race and ethnicity are defined by the Office of Management and Budget (OMB). OMB developed a government-wide, minimum set of standardized categories for reporting on race and Hispanic ethnicity, required by federal agencies. Including this information a prerequisite to receiving government funding. The current five minimum race categories are (1) American Indian or Alaska Native, (2) Asian, (3) Black, or African American, (4) Native Hawaiian or Other Pacific Islander, and (5) White. The two minimum categories for ethnicity categories are Hispanic or Latino and Not Hispanic or Not Latino (OMB, 1997a, 1997b). In research, policy making, public reporting and public funding, these categories are considered the major racial and ethnic groups in the United States. These categories are defined below:

- An American Indian or Alaska Native is a person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment.
- An Asian is a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

- Black or African American is a person having origins in any black racial groups of Africa.
- Hispanic or Latino is a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.
- Native Hawaiian or Other Pacific Islanders refers to people residing in the United States with origins in any of the original peoples of Hawaii, Guam, Samoa, or the Pacific Islands.
- White is a person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

There are key important concepts to consider about race. Racial categories are defined socially and culturally. Race is more of a social category than a biological construct. There is not a biological basis for race (Omi, M., & Winant, H., 2014). The construct of race and ethnicity are symbolic categories based upon phenotypes (*e.g.*, height, hair texture, and skin tone) and ancestry (including tribal, regional, and national affiliations.) Racial classification schemes are influenced by larger social and political considerations (Cooper and David, 1986). Race designations have changed over time. For example, some groups that are considered White in the United States today were considered Non-White in previous eras, such as people of Irish or Italian ethnicity. The way in which racial categorizations are enforced has also changed over time. For example, the racial designations of Asian American and Pacific Islander changed four times in the 19th century. This has occurred for ethnic groups in America, for example, Mexicans, who were defined at times as White, and at other times as they were defined as Non-White.

OMB data standards allow data collection instruments to include granularity if the additional detail can be aggregated back to the minimum OMB standard set of race and ethnicity categories. For example, for the question, "What is your race?" After Asian is coded or selected, it is allowable to have categories that roll up to the Asian category of the OMB standard. In this example, the additional roll-up categories might be Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, and Other Asian. There are a growing number of people who identify as being of two or more races. There is also a small share who identify as being a race other than one defined explicitly by OMB.

CPSC Injury Statistics and Technical Reports Data on Race and Ethnicity

CPSC publishes a series of statistical and technical reports on hazard types and CPSC product categories. These reports provide data on injuries and fatalities, as reported

from various injury surveillance systems and databases. This section provides specific details about data on race and ethnicity. The topic areas include carbon monoxide, fatal incidents associated with engine-driven generators and other engine-driven tools, fireworks, micromobility, product instability or tip-over injuries, injuries and deaths associated with nursery products, pool or spa submersion, estimated nonfatal drowning injuries and reported drownings, and residential fires. These reports are available on the public CPSC website at: https://www.cpsc.gov/research-and-reports-overview

Carbon Monoxide

The CPSC's Directorate for Epidemiology, Division of Hazard Analysis staff presents a statistical report, *Non-Fire Carbon Monoxide Deaths Associated with the Use of Consumer Products* (Hnatov, 2021), which provides information about the estimated number of unintentional, non-fire deaths attributed to carbon monoxide (CO) poisoning that were associated with the use of consumer products in 2018, along with companion statistics derived since 2008. Staff found evidence of a statistically significant upward trend in non-fire CO deaths for the 11-year period from 2008 to 2018. The estimated number of consumer product-related CO deaths in 2018 is greater than any other year in this report; in fact, it is greater than any estimate since the ICD-9 changeover to ICD-10 in 1999. The estimate increased for the sixth straight year. It is also should be noted that due to reporting delays, a potentially significant portion of death certificates are missing from the 2018 data. It is anticipated when these death certificates become available, the 2018 estimate will increase.

The estimated percentages of the 2016 through 2018 annual average CO deaths demonstrated race and ethnicity-based differences in CO poisoning deaths that were statistically significant (p-value = 0.0400). When viewed as one race/ethnicity versus the rest, there was a statistically significant difference between the number of White victims of CO poisoning (approximately 68 percent of all CO poisoning deaths) and the resident White population (about 61 percent of the U.S. population). The p-value of this comparison was 0.0489. CO fatalities for Blacks or African Americans represented 13 percent of all CO fatalities, while their representation in the U.S. population is 12 percent. The US population estimates are for 3-year average (2016-2018) U.S. Census Bureau 2019 estimates. The difference is not determined to be statistically significant. However, in prior years of this report, the proportion of Black or African American victims has been determined to be statistically significantly greater than the resident population. It is unclear whether this is an anomaly in the recent data or an actual change.

Additionally, as has been seen before, the proportion of the CO poisoning fatality victims who were of Hispanic ethnicity (approximately 10 percent) was below the percentage of Hispanics in the U.S. population (slightly less than 18 percent), where the

p-value was 0.0094. Among other races or ethnicities, no statistically significant differences were observed.

Table 3 provides a summary of CO fatality victims characterized by race and ethnicity for the years 2008 through 2018. Because of the growing proportion of people of Hispanic descent, Hispanic victims were categorized separately, irrespective of their race. Estimates of the percentage of the U.S. population categorized into the various race and ethnicity groupings were based on single-race characterizations, as represented in the U.S. Census Bureau reports. Non-Hispanic individuals reported as multiracial are included in the *Unknown/Other/Mixed* category.

Table 3: Estimated Non-Fire Carbon Monoxide Poisoning Deaths by Race/Ethnicity, 2008−2018

Race/Ethnicity	2016−*2018*[+]		Estimated Percentage of U.S. Population #	Annual Estimate										
	Average Estimate	Average Percent		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	*2018*
Total	**192**	**100%**	**100%**	**178**	**148**	**159**	**163**	**137**	**146**	**164**	**172**	**178**	**188**[#]	*210*
White[4]	131	68%	61%	122	93	82	106	82	86	108	109	118	121	*153*
Black or African American[4]	25	13%	12%	30	20	43	38	31	35	26	47	32	24	*18*
Hispanic (All races)	19	10%	18%	14	11	18	9	11	13	18	14	13	19	*26*
Asian / Pacific[1]	6	3%	6%	1	3	4	3	5	7	6	*	7	7	*4*
American Indian[2]	4	2%	1%	5	1	5	1	*	1	1	*	1	7	*4*
Unknown / Other / Mixed[3]	7	4%	2%	4	19	8	6	7	5	5	3	6	9	*6*

+ Data collection for 2018 is only partially complete. Italicized estimates may change in the future if more reports of deaths are received.

\# Due to several new out-of-scope incidents coming into the CPSC databases since the last report was published, some of the 2017 estimates are slightly lower than previously reported.

* No reports received by CPSC staff.

\# Based on estimated U.S. population statistics for the 3-year average (2016-2018).

1 Includes Asian, Pacific Islander, and Native Hawaiian.

2 Includes American Indian, Native American, and Native Alaskan.

3 Includes non-Hispanic Unknown races, Other races, and Multiple races.

4 Only includes non-Hispanic ethnicities.

Source: U.S. Consumer Product Safety Commission / EPHA.
CPSC Death Certificate File, CPSC In-Depth Investigation File, CPSC Injury or Potential Injury Incident File, National Center for Health Statistics Mortality File, 2008–2018.
U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population by Sex, Age, Race, and Hispanic Origin for the United States and States: April 1, 2010 to July 1, 2019. June 2020.

Note: Reported annual estimates and estimated averages and percentages may not add to subtotals or totals due to rounding.

Fatal Incidents Associated with Engine-Driven Generators and Other Engine-Driven Tools (Non-Fire Carbon Monoxide Poisoning)

The CPSC Directorate for Epidemiology, Division of Hazard Analysis staff presents a statistical report, *Fatal Incidents Associated with Non-Fire Carbon Monoxide Poisoning from Engine-Driven Generators and Other Engine Driven Tools 2011-2021* (Hnatov, 2022). This report summarizes fatal, non-fire, carbon monoxide (CO) incidents associated with all engine-driven tools (EDTs), such as generators and other engine-driven tools (OEDTs) that occurred between 2011 and 2021, and that were reported to U.S. Consumer Product Safety Commission (CPSC) staff as of May 10, 2022. Because data collection is ongoing, the number for these years most likely will increase in future reports. The information of these fatalities is anecdotal and does not represent a complete set of all incidents that may have occurred during the relevant period. However, the information represents a minimum count for the number of CO-poisoning deaths associated with these products.

The percentage of all EDT-related CO fatalities identified as non-Hispanic Black/African American (21 percent of deaths) was a much higher proportion than those classified by the U.S. Census Bureau as non-Hispanic Black or African Americans in the U.S. population (an estimated 12 percent). For generators, the percentage of non-Hispanic Black or African American victims is even higher at 23 percent, nearly double the resident population. The percentage of the other EDT-related CO fatalities identified as non-Hispanic White (87 percent of deaths) was also much higher than the proportion classified as non-Hispanic White by the U.S. Census Bureau (an estimated 61 percent of the U.S. population). It should be noted that race/ethnicity determinations are based on available information. Many of the race/ethnicity determinations are based on death certificate data. However, some states do not provide this information on the death certificate, and barring other available information, these individuals were designated as Unknown. Additionally, some individuals were identified as "mixed" or "multiple" as a race and ethnicity designation. And finally, some individuals were simply designated as Other. Individuals falling into these three designations were combined into the Other/Multi/Unknown category. The US population estimates are for 2014-2018 U.S. Census Bureau percentage of the population.

Table 4: Number of Reported Non-Fire CO Fatalities Associated with Engine-Driven Tools by Race/Ethnicity of Victim, 2011–2021

Race/Ethnicity	2018 5-Year Estimated U.S. Resident Population[1]	All Engine-Driven Tools (EDTs)		Generators		All Other Engine-Driven Tools (OEDTs)	
		Deaths	Percentage	Deaths	Percentage	Deaths	Percentage
Total	100%	900	100%	814	100%	86	100%
White [2]	61%	533	59%	458	56%	75	87%
Black/African American [2]	12%	189	21%	186	23%	3	3%
Hispanic (any race)	18%	105	12%	103	13%	2	2%
Asian [2]	5%	15	2%	15	2%	0	0%
Native American[2,3]	1%	11	1%	11	1%	0	0%
Other/Multi/Unknown	3%	47	5%	41	5%	6	7%

Sources: U.S. Consumer Product Safety Commission, Directorate for Epidemiology, 2022.
5-Year Estimates of the Resident Population by Sex, Age, Race, and Hispanic Origin for the United States January 1, 2014, to December 31, 2018.
This percentage represents the 2014-2018 Census-estimated percentage of the U.S. population, an approximate midpoint of the 11-year range.

1 These Race/Ethnicity designations are for single race only.
2 Includes American Indian, Alaska Native, Native Hawaiian, and Other Pacific Islander.
Includes Other races, multiple Races, and those where the race of the victims is unknown. Notes: Totals may not add to 100 percent due to rounding.

Fireworks

The CPSC Directorate for Epidemiology, Division of Hazard Analysis staff presents a statistical report, *Fireworks- Related Deaths, Emergency Department-Treated Injuries and Enforcement Activities During 2021* (Smith, 2022). CPSC staff provides analysis of data on non-occupational, fireworks-related deaths and injuries during calendar year 2021, and staff summarizes enforcement activities during fiscal year 2021. Fireworks were involved in an estimated 11,500 injuries treated in U.S. hospital emergency departments during calendar year 2021 (95 percent confidence interval 8,300–14,700). The estimated rate of emergency department-treated injuries is 3.5 per 100,000 individuals in the United States, a decrease from 4.7 estimated injuries per 100,000 individuals in 2020. There is a statistically significant trend in estimated emergency department-treated, fireworks-related injuries from 2006 through 2021. This trend estimates an increase of 274 fireworks injuries per year (p-value = 0.0004).

Table 5 shows that each year, the number of victims treated are mostly White, followed by victims of an Unknown Race, Black or African American victims, and

victims of an Other race. The Other race category contains Asian, Pacific Islander or Native Hawaiian, and American Indian or Alaskan Native individuals. CPSC began collecting ethnicity information in 2018, which includes information about whether a victim is Hispanic. Consequently, ethnicity information cannot be included at this time for the full 2006 through 2021 period.

Table 5: Estimated Fireworks-Related, Emergency Department-Treated Injuries by Race 2006-2021

Year	White		Black or African-American		Other		Unknown		Total
	N	%	N	%	N	%	N	%	N
2006	5,200	56.0	900	9.3	600	6.7	2,600	28.1	9,200
2007	5,500	56.8	800	8.6	500	5.6	3,000	29.0	9,800
2008	4,500	63.8	400	6.4	400	5.9	1,700	23.9	7,000
2009	6,000	68.6	600	7.4	400	4.9	1,700	19.1	8,800
2010	5,000	58.4	600	7.1	600	6.6	2,400	27.9	8,500
2011	5,800	60.8	800	8.7	1,200	12.6	1,700	17.9	9,600
2012	5,200	59.6	800	8.8	700	10.0	1,900	21.6	8,700
2013	6,800	60.0	600	5.4	1,000	9.2	2,900	25.4	11,400
2014	5,600	52.9	800	7.8	600	5.5	3,600	33.8	10,500
2015	6,400	53.7	1,000	8.3	1,000	8.5	3,500	29.5	11,900
2016	5,800	51.9	1,500	13.3	1,400	12.4	2,500	22.4	11,100
2017	7,100	54.9	800	6.3	1,600	12.5	3,400	26.4	12,900
2018	4,900	53.7	1,200	12.7	700	8.0	2,400	25.7	9,000
2019	5,500	54.7	1,500	14.9	400	3.8	2,700	26.6	10,000
2020	8,100	51.5	3,000	18.7	1,000	6.7	3,600	23.1	15,600
2021	5,600	49.1	1,700	14.7	600	5.2	3,600	31.0	11,500

Source: NEISS, U.S. Consumer Product Safety Commission.
Race percentages do not match the previous paragraph's values, as incidents with unknown race values are included in the calculations for Table 5.

Table 5 shows the trend by race across years. There is a statistically significant upward trend for White victims (p =0.0031), but not Black or "Other" race victims. Between the years 2020 and 2021, there was a significant decrease in the number of White victims (p=0.0077), but neither Black, nor "Other" race victims experienced a significant change.

When comparing the proportion of victims with a known race to the U.S. population, there were proportionately fewer White victims (70.9 percent of victims, 75.9 percent of the U.S. population identifies as white), proportionately more Black victims (21.5 percent of victims,13.6 percent of the U.S. population identifies as black), proportionately fewer victims associated with an "Other" race (7.6 percent of victims, 7.7 percent of the U.S.

population identifies as another race). These percentages are calculated using only the victims where race was collected. Victims with unknown race values accounted for more than 31 percent of all fireworks incidents in 2021.

Micromobility

The CPSC Directorate for Epidemiology, Division of Hazard Analysis staff presents a statistical report, *Micromobility Product Related Deaths, Injuries, and Hazard Patterns* (Tark, 2022), which summarizes the injuries, deaths, and hazards associated with the use of micromobility products, based on data from the CPSC's epidemiological databases from 2017 through 2021. Data from 2021, were added to the data from 2017 through 2020, previously presented in the 2021 annual report on micromobility products. The micromobility products covered in this report are:

- electric scooters (*i.e.*, e-scooters: electric-powered, motorized standing scooters), including ride-sharing dockless/rental e-scooters;
- hoverboards (also referred to as self-balancing e-scooters that are electric-powered, two-wheeled standing scooters with no handlebars); and
- electric bicycles (*i.e.*, e-bikes: motorized bicycles powered by battery to assist riders' pedal-power, with a maximum speed of 15-20 mph).

Electric unicycles, three-wheeled e-scooters, non-electric kick scooters, gas-powered scooters, mobility scooters, mopeds, motorized carts, and other seated motorized scooters are not in scope for this report.

Figure 1 shows the distribution of estimated micromobility-related injuries versus the general U.S. population distribution by race and ethnicity from 2019 through 2021. The population data corresponding to the average of the 3 years, 2019 through 2021, was from the U.S. Census Bureau. As Figure 1 shows, the proportion of estimated injuries sustained by Blacks was 31 percent for overall micromobility and 37 percent for e-scooters. These injuries were disproportionately high, compared to the proportion of Blacks in the general U.S. population (13 percent). However, staff notes some limitation in interpretation of the data presented in Figure 1, for two reasons. First, only 76 percent (144,200/189,700) of the estimated micromobility injuries between 2019 and 2021 provided race/ethnicity information. Second, micromobility injuries (especially for e-scooters and e-bikes) are skewed towards younger and possibly more urban sub-populations, and staff is uncertain which reference basis of race/ethnicity baseline is applicable.

Figure 1: Distribution of Estimated ED Visits Associated with Micromobility by Product Type and Race/Ethnicity, where known, (2019–2021 Total), Compared to U.S. Population Race/Ethnicity Distribution
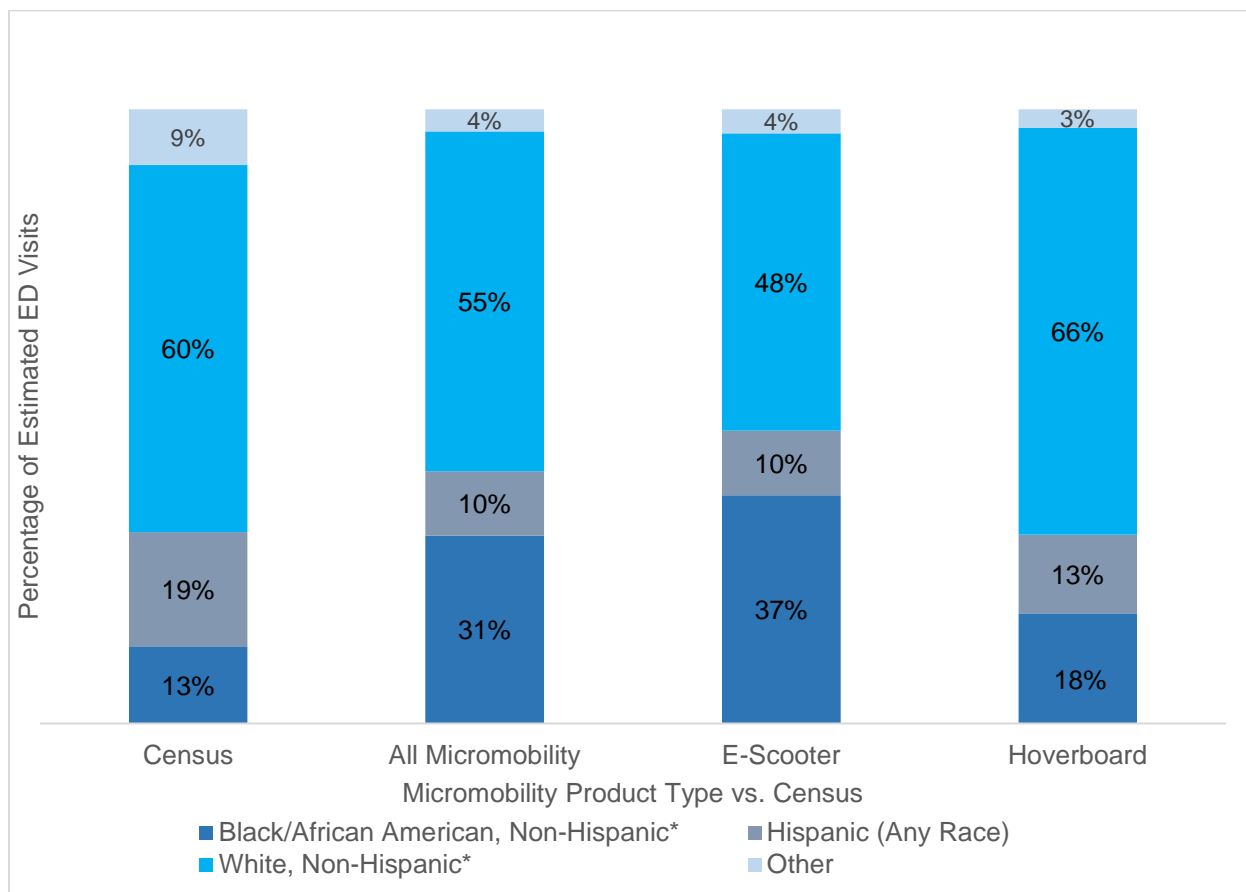
Source: NEISS, U.S. Consumer Product Safety Commission, 2019-2021.
Asterisks (*) indicate Race/Ethnicity designations are for reported single race only. The Other category includes the proportion of the U.S. population that is not counted among the non-Hispanic Black, Hispanic, or non-Hispanic White people in U.S. Census figures.
+Race/Ethnicity percentages are based on the known data that was available in only 76 percent of cases.

As of the writing of this report, the Hispanic ethnicity variable has only been recorded for NEISS years 2019 through 2021. Therefore, analysis concerning race/ethnicity for the estimated number of ED-treated micromobility injuries was based on the years 2019 through 2021. Estimates of micromobility injuries involving races/ethnicities other than Black or African American, Hispanic, or White were not statistically reliable for the data available, and hence, not presented.

Product Instability or Tip-Over Injuries

The CPSC Directorate for Epidemiology, Division of Hazard Analysis staff presents the report, *Product Instability or Tip Over Injuries and Fatalities Associated with Televisions, Furniture and Appliances* (Suchy, 2022) providing statistics on injuries and fatalities associated with television, furniture, and appliance product instability, or tip-over incidents. Tip-over incidents include scenarios where heavy furniture falls on an individual from some type of interaction, such as climbing or exerting a force on the product while it is in one of its positions of normal use. Product instability that can lead to a tip-over incident can be caused or affected by an unstable design (small footprint, top heavy), use on a sloped or unstable surface (carpet), non-use of a tip-over restraint device or use of a defective tip-over restraint device, heavy objects on top of furniture, or multiple open drawers. The report presents a national estimate of emergency department-treated instability or tip-over injuries, followed by the counts of reported fatalities. The injury estimates are for years 2019 through 2021, and fatal incidents are reported to have occurred from 2000 through 2021.

From 2019 through 2021, out of the estimated annual average of 19,400 tip-over injuries to all ages, only 13,600 (70 percent) were to patients whose race and ethnicity were known. From 2019 through 2021, 67 percent (5,900 annual injuries) of tip-over injuries to children, 76 percent (5,300 annual injuries) of tip-over injuries to adults, and 68 percent (2,500 annual injuries) of tip-over injuries to seniors were patients whose race/ethnicity were known.

Table 6 represents the proportion of the estimated annual average of ED-treated, tip-over injuries by race/ethnicity, that occurred to patients whose race/ethnicity were known, as well as the estimated annual average of the U.S. population in parentheses, for the years 2019 through 2021. The proportionate number of people of each race/ethnicity in the U.S. population can be compared with the proportion of the estimated number of ED-treated tip-over injuries for each age group by race/ethnicity category.

Table 6: Proportion of Product Instability or Tip-Over-Related Estimated ED-Treated Injuries and the Annual Average Estimate Proportion of the U.S. Population by Race and Ethnicity and Age Group, 2019–2021

Race / Ethnicity	Children (<1 to 17 years)	Adults (18 to 59 years)	Seniors (60 years and older)	All Ages Total
Total	100% (100%)	100% (100%)	100% (100%)	100% (100%)
White, Non-Hispanic*	64% (50%)	49% (58%)	86% (74%)	64% (60%)
Black / African American, Non-Hispanic*	18% (14%)	35% (13%)	– (10%)	23% (13%)
Hispanic (Any Race)	16% (26%)	12% (20%)	– (9%)	12% (19%)
Other	– (11%)	– (9%)	– (6%)	3% (9%)

Source: U.S. Consumer Product Safety Commission: NEISS. The estimates include cases for television, furniture, and appliance product codes, as described in Appendix B. All injuries where the race/ethnicity of the patient is unknown are not reported. Estimates that are not statistically reliable are presented as "–" (see Appendix A). Estimates are rounded to the nearest percent and may not add up to the total, due to rounding. Asterisks (*) indicate Race/Ethnicity designations are for reported single race only. The coefficients of variation (CVs) for the given estimates ranged from 0.1065 to 0.3213.

[1] Injury estimates are rounded to the nearest hundred.

Fatality counts should be considered incomplete for years 2020–2021, due to a time lag in reporting to CPSC.

Between 2012 and 2021, there were 12 NEISS tip-over injuries that ultimately resulted in deaths. Of these 12 deaths, one occurred at some point between 2019 and 2021. All these deaths are included in both the national annual estimates throughout the NEISS "injury" section and the fatality section of this report.

Between 2000 and 2021, there were 22 NEISS fatalities, and all of them appear in the fatality section of this report.

Percentages may not sum to 100, due to rounding.   The Other category includes the proportion of the U.S. population that are not counted among the non-Hispanic Black, Hispanic, or non-Hispanic White people in U.S. Census figures.

The U.S. population estimate for each age group is an average of 2019–2021 data of that age group, from the month of July from each year, derived from the "Monthly National Population Estimates by Age, Sex, Race, Hispanic Origin, and Population Universe for the United States: April 1, 2010 to December 1, 2020 (with short-term projections to December 2021)" file in the U.S. Census data found at: https://www.census.gov/programs-surveys/popest/technical-documentation/research/evaluation-estimates/2020-evaluation-estimates/2010s-national-detail.html

From 2019 through 2021, of the patients categorized as White, compared to the proportion of the U.S. population categorized as White, there are:
- proportionately more White children injured (64 percent of injuries to 50 percent in the population);
- proportionately fewer White adults injured (49 percent of injuries to 58 percent in the population); and
- proportionately more White seniors injured (86 percent of injuries to 74 percent in the population).

From 2019 through 2021, of the patients categorized as Black, compared to the proportion of the U.S. population categorized as Black, there are:
- proportionately more Black children injured (18 percent of injuries to 14 percent in the population); and

- proportionately more Black adults injured (35 percent of injuries to 13 percent in the population).

From 2019 through 2021, of the patients categorized as Hispanic, compared to the proportion of the U.S. population categorized as Hispanic, there are:
- proportionately fewer Hispanic children injured (16 percent of injuries to 26 percent in the population); and
- proportionately fewer Hispanic adults injured (12 percent of injuries to 20 percent in the population).

Injuries and Deaths Associated with Nursery Products

The CPSC Directorate for Epidemiology, Division of Hazard Analysis staff presents statistics regarding I*njuries and Deaths Associated with Nursery Products among Children Younger than Age Five* report (Yang, 2022). NEISS analytical datasets from the previous year were used for comparison. In 2021, there were an estimated 53,000 emergency department-treated injuries associated with (*i.e.,* in use at the time of incident), but not necessarily caused by, nursery products among children younger than 5 years of age. This translates to an injury rate of an estimated 281 injuries per 100,000 children under the age of 5 years (Annual Estimates of the Resident Population by Single Year of Age and Sex for the United States). The increase from the total 2020 injury estimate is statistically significant and is presumed to reflect a reduction in emergency department avoidance due to COVID-19 that was apparent in 2020 (Schroeder T. & Cowhig M. 2020).

- For 2019–2021, on average, race information is known in about 60 percent of the injuries, while ethnicity information is known in about 44 percent of the injuries.

- Where information is available, the injury and population distributions by race appear to be closely aligned for each year from 2019 through 2021.
- Ethnicity data are insufficient to allow for presentation of any estimates.

Table 7 shows the breakout of injury estimates by race for each year from 2019 through 2021. Over the 3-year time frame, on average, the victim's race was unspecified for 40 percent of the estimated nursery product injuries. White children made up 45 percent of victims under the age of 5; Black/African American children made up 10 percent of victims; and children of other races made up less than 5 percent of victims. When considering only the injuries where race was known, on average, 75 percent were White (compared to 70 percent of the population for that age); 17 percent were Black (compared to 16 percent of the population for that age); and 3 percent were Asian (compared to 6 percent of the population for that age). As Table 7 shows, the

distribution of estimated injuries by race has not changed much year-over-year during the period 2019 through 2021. However, due to the high proportion of the data with race information unspecified, this finding should be interpreted with caution.

Staff explored the injury data for information on ethnicity of victims. Although NEISS is equipped to capture such information, for the period 2019 through 2021, for nursery product injuries among children under 5 years of age, the ethnicity is unspecified for most of the data.

Table 7: Distribution of Population and Estimated Emergency Department-Treated Injuries by Race Among Children Under Age Five: 2019–2021

Race	2019		2020		2021	
	Percent of		Percent of		Percent of	
	Estimated Injuries	Population	Estimated Injuries	Population	Estimated Injuries	Population
White	75%	70%	74%	70%	76%	69%
Black/African American	19%	16%	18%	16%	15%	16%
Other	4%	6%	3%	6%	6%	6%
Asian	1%	6%	4%	6%	3%	6%
American Indian/Alaska Native	1%	2%	1%	2%	1%	2%
Native Hawaiian/Pacific Islander	<0.5%	<0.5%	<0.5%	<0.5%	<0.5%	<0.5%
Total	100%[†]	100%	100%[‡]	100%	100%[§]	100%

Source: NEISS, CPSC. Percentages may not add up to 100, due to rounding.
Other: By NEISS definition, this category includes any race not explicitly listed in Table 3, or when more than one race is indicated.
Note: †This accounts for 58 percent of total estimated ED-treated nursery product-related injuries in 2019 for children under 5.
‡This accounts for 60 percent of total estimated ED-treated nursery product-related injuries in 2020 for children under 5.
§This accounts for 60 percent of total estimated ED-treated nursery product-related injuries in 2021 for children under 5.

Pool or Spa Submersion: Estimated Nonfatal Drowning Injuries and Reported Drowning

The CPSC Directorate for Epidemiology, Division of Hazard Analysis staff presents a statistical report on *Pool or Spa Submersion: Estimated Nonfatal Drowning Injuries and Reported Drownings* (Yang, 2022). For 2019 through 2021, an estimated annual

average of 6,300 children younger than 15 years of age were treated in U.S. hospital emergency departments (EDs) for nonfatal injuries associated with pool or spa submersions. Injury estimates are based on CPSC's NEISS data, where sampling weights are used to project the cases from NEISS hospitals to national estimates. The corresponding annual average estimates for the years 2018 through 2020, were 6,200 children younger than 15 years of age and 4,800 children younger than 5 years of age treated in hospital emergency departments for nonfatal drowning injuries in pools or spas.

Table 8 shows the percentage of the estimated number of pool- or spa-related, nonfatal drowning injuries by the victim's race. For more than 50 percent of estimated nonfatal drowning injuries involving children under 15 years of age, the victim's race was unspecified. White children made up 34 percent of victims younger than 5 years of age and 35 percent of victims between 5 and 14 years of age. Black or African American children were 6 percent of victims younger than 5 years of age and 18 percent of victims between 5 and 14 years of age. Children of other races made up less than 5 percent of victims across all age groups. Overall, White children represented the highest percentage of victims under 15 years of age, at 34 percent. Focusing on those injuries where race was known, 74 percent were White (compared to 72 percent of the population for that age); 19 percent were Black or African American (compared to 15 percent of the population for that age); and 3 percent were Asian (compared to 5 percent of the population for that age) for children younger than 15 years old. This skews more for Black or African American 5- to 14-year-olds, where they represented about 32 percent of the incidents, yet only 15 percent of the population for that age group. However, these findings are not definitive, given the high proportion of unspecified races.

Table 8: Percent of Estimated ED-Treated, Nonfatal Pool or Spa Drowning Injuries to Children Younger than 15 Year of Age by Race, 2019-2021

Race	Estimated Emergency Department-Treated Injury Percentages		
	Younger than 5 Years	5-14 Years	Younger than 15 Years
Not stated	56	43	54
White	34	35	34
Black/African American	6	18	9
Other	2	1	2
Asian	1	3	1
American Indian/Alaska Native	0	0	0
Native Hawaiian/Pacific Islander	0	-	0
Total	100	100	100

Source: U.S. CPSC: NEISS Note: Percentages may not add up to 100, due to rounding: In this table, 0 represents < 0.5%. "-" denotes no data recorded. NEISS injury data are equipped to capture details on the ethnicity of the patient. However, for 2019 through 2021, pool or spa drowning injuries among children under 15 years of age, the ethnicity is unspecified for most of the data.

Residential Fire Loss

The CPSC Directorate for Epidemiology, Division of Hazard Analysis staff presents a statistical report on *U.S. National Estimates of Residential Fires, Deaths, Injuries, and Property Losses from Unintentional Fires* (Miller, 2021) with estimates of consumer product-related losses that occurred in U.S. residential structure fires attended by the fire service. The estimates were derived from data provided by the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA) Survey of Fire Departments for U.S. Fire Experience for 2016 through 2018. In 2021, CPSC staff analyzed the fire loss data for victims' demographic characteristics, such as age and race. This was the first year of this type of analysis. Staff estimated total residential structure fire deaths and injuries for 2016 through 2018, broken down by victim age and victim race categories, and staff used U.S. Census Bureau population estimates to compute estimated death and injury rates.

Table 9 provides estimates of the rate of fire deaths and injuries by race. The estimated per capita fire death rate of African Americans, 1.3 per hundred thousand, is nearly twice the overall rate. The estimated rate of injuries per person for African Americans (5.7 per hundred thousand), and for Other – Including multi-racial (4.9 per hundred thousand) are much higher than the overall rate (2.8 per hundred thousand).

Table 9: Unintentional Residential Fire Death and Injury Estimates by Race: 2016-2018

Race	Fire Deaths per Hundred Thousand People	Fire Injuries per Hundred Thousand People
Overall	0.7	2.8
White	0.7	2.4
Black/African American	1.3	5.7
Asian	0.1	0.7
American Indian, Aleut	0.5	1.0
Other – Including multi-racial	0.7	4.9

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA

There is an NFIRS variable for ethnicity that has codes for Hispanic and Other. However, the instructions for coding this variable advise leaving it blank if the ethnicity is unknown or is not listed among the codes. CPSC staff is concerned that this causes confounding of the Others and Unknowns and would cause estimates to be unreliable. For this reason, staff decided not to include estimates of fire deaths and injuries by Hispanic/Non-Hispanic origin.

CPSC Hazard and Injury Data Systems

The CPSC has jurisdiction over thousands of types of consumer products, from children's toys to portable generators, to bicycles, cribs, and toasters. The CPSC accomplishes its mission to protect consumers against the unreasonable risks of injury and death associated with consumer products by using analysis, regulatory policy, compliance and enforcement, and education, to identify and address product safety hazards. This important work includes collecting information and developing injury and death statistics regarding the use of products under the CPSC's jurisdiction. The omission of racial and ethnic data inhibits the study and resolution of consumer product injuries and fatalities in the United States.

Deaths, injuries, and property damage from consumer product incidents cost the nation more than $1.8 trillion U.S. dollars (Lawrence, B., et al. (2018). The CPSC injury surveillance program is designed to collect, report, and distribute data and information to prevent hazardous products from reaching customers, to reduce the rate of deaths and injuries associated with consumer products, and to educate the public.

Cloud-Based Technology and Analytic Tools

CPSC is working with internal and external partners to improve the infrastructure and business systems to enable the collection, analysis, and distribution of accurate and timely information. The current modernization effort is upgrading the CPSC architecture, reducing the risk of technological obsolescence.

CPSC's Office of Information and Technology Services (EXIT) is migrating CPSC data into a cloud-based data lake to facilitate surveillance, analysis, and reporting, with completion of the migration scheduled for the end of FY 2024. The upgraded CPSC information technology infrastructures gives CPSC statisticians, analysts, program area risk managers, and others, the capability to use the new cloud-based machine learning and data science software purchased with FY 2021 American Rescue Plan funds for installation and FY 2022 funds for migration and training.

A large portion of CPSC data is textual in nature and requires searching for keyword indicators of product failure. CPSC analysts use lists of keywords to search in lengthy text fields imbedded in many files. In many cases, these keyword lists are coded to allow for fuzzy matching in case a term is misspelled. This software tool can help to optimize digitized data assets, by allowing CPSC to text mine unstructured dataset within the CPSC data systems, for example, within the notes of Incoming Death Notifications, Internet Customer Reviews, and In-Depth Investigations to categorize key phrases. An example is searching CPSC databases for cases "where a wheelchair was in the write up," which can give clues and additional details about wheelchairs with a higher probability of tipping backward. Employing cloud technologies, CPSC statisticians and analysts can create and share a repository list of terms. This will provide more transparency and consistency in reporting and still allow any statisticians and analysts to add values that are specific to the project need.

With new IT tools in the cloud environment, CPSC can automate open-source data exchanges with an application programming interface (API). An API is a software-to-software communication providing a secure and standardized way for applications to work with each other. APIs are transformational and serve as a fundamental building block, accelerating the ingestion and dissemination of disparate datasets to share across networks. The recent data imputation study contract developed a CPSC connection to the U.S. Census API. A connection to the U.S. Census APIs gives CPSC access to population data, as population-based surveillance is one of the most preferred methods of monitoring, reporting, and analyzing risk factors. It also allows for the possibility of future development of customer-facing mobile and consumer safety-

oriented applications widening digital accessibility across demographics. Available U.S. Census APIs are available on the U.S. Census Bureau's public website: https://www.census.gov/data/developers.data-sets.html

The CPSC has four primary datasets it uses for consumer product safety surveillance. All of these datasets have publicly available versions, with personally identifiable and business information redacted/removed, and that can be found at: https://cpsc.gov/cgibin/NEISSQuery/home.aspx, https://saferproducts.gov, and https://www.cpsc.gov/epidemiology/cpsc_epi/clearinghouse.html (the latter of which contains items 2-4 below).

1. NEISS: statistically valid injury surveillance data are collected on a broad range of injury-related incidents occurring in the United States.
2. Death certificates: records involving consumer products are provided to CPSC through state programs and state health departments.
3. In-Depth Investigation Files (IDI): files and injury and potential injury incident database; document investigations into events surrounding product-related injuries or incidents. Based on victim/witness interviews, the reports provide details about incident sequence, human behavior, and product involvement.
4. Injury and Potential Injury Incident (IPII) Database: maintains reports from numerous sources of incident information where a medically treated injury or fatality occurred. Data sources include news clips, as well as reports from medical examiners/coroners, manufacturers/retailers, and consumers (including SaferProducts.gov reports).

National Electronic Injury Surveillance System (NEISS)

NEISS, in operation since the early 1970s, consists of a statistically valid, stratified probability sample of approximately 100 hospitals throughout the United States (and its territories) with at least 6 beds and 24-hour emergency department services. The NEISS collects approximately 400,000 product-related injury incidents annually from participating hospitals representing a national estimate of more than 14 million product-related injuries treated at hospital emergency departments.

Coded data for injury-related cases and a narrative text are entered into an electronic health record module by trained coders. Data obtained in each case include principal diagnosis, primary body part affected, age, race/ethnicity, gender, disposition at ED discharge (*e.g.*, dies, observation, released, treated, transferred), location where injury occurred, major categories of external cause of injury, and the intent of injury (*e.g.*, unintentional, assault, intentional self-harm, legal intervention) consistent with the International Classification of Disease, Tenth Revision, Clinical Modification (ICD-10-CM) coding guidelines. NEISS data are limited to retrospective analysis of data. NEISS data include variables called Race, RaceOth, and Hispanic, which record information about the race and ethnicity of emergency department- (ED) treated patients. The Hispanic ethnic variable was accurately recorded starting 2019.

The optimal scenario would be to have every NEISS hospital currently capturing race and ethnicity information for every patient in their medical records so that NEISS coders can also obtain this information for every NEISS record. However, this information is frequently absent from the medical information accessible to NEISS coders; thus, it is not included in the NEISS data.

Each NEISS hospital is evaluated annually, during which a treatment date is randomly selected, and the cases identified and coded by the NEISS coder are evaluated for accuracy by CPSC personnel or their contracted evaluation staff. This includes a review of the capture of available race and ethnic information. In cases where comparisons between race and/or ethnicity among the proportions of the people in the U.S. population and the proportions of the estimated number of injuries by race and/or ethnicity, all injuries where the race and/or ethnicity of the patient are unknown are not reported in estimated ED-treated injuries and the annual average estimated proportions of the U.S. population by known race and/or ethnicity. In analysis, the proportionate number of people of each race and/or ethnicity in the U.S. population can be compared with the proportion of the estimated number of ED-treated injuries for each race and/or ethnicity category.

NEISS data are limited by several other factors. NEISS data are primarily injuries, and only a small number of fatalities occur in the ED. The NEISS details are generally restricted to information that medical personnel deem noteworthy for their medical records. Also, NEISS cases typically do not include detailed manufacturer information.

Table 10 shows the core variables that appear as records within the NEISS data system.

Table 10: Core Variables of NEISS Module

The Core Variables of NEISS Module	
Patient Data	**Specific Data**
• Date of injury • Date of Birth (Age) • Gender • Race/Ethnicity • Part of body injured • Principal Diagnosis • Diagnosis 2 and others • Primary Body Part • Body part 2 and others • Disposition at Discharge	• Case number • Zip code of hospital • Product Involved • Intention of Injury • Fire Involvement • Work-Related • Narrative (# characters)

Consumer Product Safety Risk Management System (CPSRMS)

The CPSC created a consolidated database, referred to as the Consumer Product Safety Risk Management System (CPSRMS), which brings together the available data sources and assets to inform CPSC staff and management when conducting risk assessments, by identifying high occurrences of injuries and unsafe products. However, because of the voluntary and anecdotal nature of these reports, staff cannot be sure the information on all the deaths has been received. There are limitations to CPSRMS data, as individual incidents often lack details. In addition, because the set of data is not statistically representative, it cannot be used to develop national estimates or annual trends. There are three data assets within CPSRMS, each with specific strengths and weaknesses: Incident and Potential Injury Incident collections (IPII), Death Certificate (DTHS) Files, and In-Depth Investigations (IDIs).

Incident and Potential Injury Incident (IPII)

The CPSC IPII is a collection of documents with varying degrees of specificity on race, demographics, product, and incident. The repository includes news clips, information from the Medical Examiner and Coroner Alert Program, referrals from federal/state/local partners, other reports, including reports from SaferProducts.gov, the Office of Compliance, and manufacturers. The IPII offers varying degrees of specificity on the

product. The IDIs within the system are difficult to search. A statistician and analyst must manually categorize unstructured data in the data system.

Table 11 shows the percent of missing data in the IPII database, received calendar year 2019, where a medically treated injury occurred. The IPPI provides reports from numerous sources, including medical examiners, news clips, consumers, and other credible providers of incident information. The table below excludes Section 15 and Retailer reports, because their degree of missing information is sufficiently high to make analysis of vulnerable populations problematic. Hispanic origin reports include all the elements that might be useful in future analysis, while many records lack key details that would more fully explain death and injury patterns involving consumer products.

Table 11: Missing Information in 2019 Medically Treated IPII Reports Received in 2019

Variable	Records Lacking Data Element	% Missing
(Total Number of Records)	9,796	N/A
Sex	1,359	13.9%
Race	7,580	77.4%
Ethnicity (Hispanic Origin)	8,766	89.5%
Age	2,509	25.6%
Income/Education (Not Captured)	9,796	100.0%
Location	9,410	96.1%

Death Certificate Files (DTHS)

Another component of CPSRMS, among the most detailed assets, are the death certificate files, also known as DTHS, caused by, or related to consumer products from 50 States and multiple other jurisdictions. CPSC purchases around 8,000 death certificates a year. Each entry for a death contains a single underlying cause of death; up to 20 additional multiple causes of death and demographic data of the person, including place of residence, age, race, Hispanic or non-Hispanic ethnicity, gender, place of death, time of death, and whether an autopsy was performed. Mortality data from the death certificates are either entered by the physician certifying a death coded by the states or the care coded from copies of the original death certificate. A classification under specific external cause-of-death codes (International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10 Codes) is a part of the death file.

The death certificate files also offer specific descriptions about the cause of death, but often lack specifics about a consumer product attributed to the death. Death files are the most reliable source for race and ethnicity identification (Horan, J.M. & Mallonee, S., 2003). They offer an opportunity to isolate the residential location (zip code) and a surname. Geocoding analysis, using addresses to identify geographic areas where populations live, and linking them to the U.S. Census data is possible. Another possibility is conducting a surname analysis, using an individual's last name, to estimate the likelihood that individuals belong to a particular racial or ethnic group. Surname analysis is more reliable for identifying Hispanics and Asians than it is for identifying African Americans (Fiscella, K., & Fremont, A. M. (2006). There is the potential for death certificates to greatly undercount the number of deaths for some racial and ethnic groups, and overcount deaths for other racial groups, because the certifier identifies the race and ethnicity of the deceased differently from the U.S. Census. This demonstrates an important fact. Racial and ethnicity identification can depend on who is identifying the individual and how the data are provided to CPSC. The certificates are scanned and coded for entry into the CPSRMS by the CPSC's Division of Hazard and Injury Data Systems. In some cases, the death certificates are provided in a machine-readable format. About 60 percent of the death certificates are not readable, given how they are transmitted to CPSC.

Table 12 shows the degree to which data elements are missing in death certificates received in calendar year 2019. Hispanic origin and race can be found more frequently in death certificates than in NEISS, but these data elements are still missing in proportion. The city and state are nearly always present, although the zip code is less frequently provided. When not found directly on death certificates, the county can be derived from the city and state.

Table 12: Missing Information in CPSC Death Certificates Received in 2019, Out of 4,686 Death Certificates

Variable	Records Lacking Data Element	% Missing
(Total Number of Records)	4,686	N/A
Sex	0	0.0%
Race	478	10.2%
Ethnicity (Hispanic Origin)	955	20.4%
Age	1	<0.1%
Income/Education (Not Captured)	4,686	100.0%
Location	3007	64.2%

In-Depth Investigations (INDP)

CPSC's INDPs are another component within CPSRMS. In-Depth Investigations, or IDIs, are detailed investigations offering highly valuable information and insights into human factors, location, and narrative circumstances.

Table 7 shows the degree to which data elements are missing in INDPs completed in calendar year 2019, where medically treated injuries occurred. Victim information is not collected where no injury occurred. Race can be found more frequently in IDIs than in NEISS, but race is still missing 19.4 percent of the time. The city and state were nearly always present, although the zip code is not populated in INDP data tables. It is likely that zip codes can be found in a number of source documents.

Table 13: Missing Information in 2019 Medically Treated In-Depth Investigations

Variable	Records Lacking Data Element	% Missing
(Total Number of Records)	1,559	N/A
Sex	5	0.3%
Race	302	19.4%
Ethnicity (Hispanic Origin)	395	25.3%
Age	3	0.2%
Income/Education (Not Captured)	1,559	100.0%
Location	10	0.6%

Data Limitations in Consumer Product Surveillance and Research

In the field of injury research and surveillance, data sources with indicators for diverse population groups, as well as comprehensive injury and outcome data, is limited. For instance, while many studies assessed have disparities by race and ethnicity group, most of these studies relied upon race and ethnicity categories from public health administrative data.

There are several measures that may increase awareness of consumer products that might impact vulnerable populations disproportionately. These include:

- Building predictive data-imputation models that can assign values for missing information;
- Using demographic data, including location data, and information to identify disparities that may exist across other dimensions (*e.g.*, related to education, income, and race prevalence by location);
- Identifying and using other injury and public health surveillance datasets, databases, and resources.

Data Imputation and Pilot Study

Imputation is a technique used to assign a value to a missing variable, based on other indicators that may correlate to membership in one subgroup or another. For example, a record might be missing the gender of the victim, but it mentions that the victim was pregnant. In that case, ascribing the gender as female is highly likely to be accurate.

Missing and underreporting of race and ethnicity data is a common challenge across the U.S. government. The U.S. Department of Health and Human Services (HHS) has also attempted to impute its missing data for administrative data, health insurance enrollment information. To address the nearly 20 percent of Medicaid and 30 percent of marketplace enrollees who do not report their race and ethnicity, as well as misclassification of some Medicare beneficiary's data based on previous Social Security categories of White, Black or African American, and other data, the U.S. HHS is currently using imputation (and other methods). The results have helped the U.S. HHS evaluate the effects of enrollment outreach campaigns and map healthcare disparities to social factors.

Accuracy in assigning values is particularly important if the imputed (assigned) variable value will be the key attribute to be compared. For example, if we incorrectly assigned someone's gender where it could not be determined directly, it can cause gray areas when comparing men to women. Accuracy of any imputation effort is limited by the degree to which the known information is predictive.

Data Imputation modeling requires a commitment of resources, including staff time, network/computing capacity, and/or the cost of outsourcing an imputation effort. In addition, given that the quality of the imputation is limited by the degree that known variables are predictive, there is no assurance that highly accurate imputation is possible.

In FY 2022, CPSC contracted to conduct a pilot data-imputation study in its continuing efforts to identify gaps in data and to seek improvements in data analytics as part of our commitment to equality and meeting the requirements of the EO 13985. This is an ongoing effort to improve the volume and variety of CPSC data relevant to U.S. populations. Data imputation is performed through five statistical methods: random forests; auto-associative neural networks with genetic algorithms; auto-associate neuro-fuzzy configurations; and two random forest and neural network-based hybrids. The data scientists are training and testing various CPSC systems' data. The study is set to statistically estimate missing demographic data, training and testing using mentioned statistical methods to help understand where the gaps in race and ethnicity data occur.

The CPSC Data Imputation contract will provide technical documentation on processes and decision criteria. It will also identify skills gaps and provide training to CPSC staff members and other identified contractors to ensure adoption of proposed processes, procedures, and information technology solutions. The CPSC Data Imputation deliverables, specifically, include:

1. A technical report that details data sources, workflow, methods employed, and decision criteria for imputation. This will also include all codes annotated.
2. An imputation summary report to explain the project and results to a non-technical audience.
3. An EO 13985 hazard breakdown report that identifies risks to underserved populations using imputed data over time and by location.

Although highly accurate predictions may not be possible, results from the pilot will inform the agency about the viability of the approach for the long term.

Data Opportunities in Consumer Product Surveillance and Research

In May 2022, EXHR hired a Diversity Risk Manager (DRM) for diversity, equity, and vulnerable population studies. In partnership with the Directorate for Epidemiology (EXHA), this position is responsible for examining program areas to look for such patterns and trends.

Another way to improve insights into hazards specific to vulnerable populations is to use demographic data, including location data, and information to identify disparities that may exist across other dimensions (*e.g.*, data related to education, income, and race prevalence by location).

CPSC Data Systems Location Data Fields

In the absence of data about race or income at the individual level in CPSC Data Systems, the shared attributes of a location might be useful indicators of disparities. For example, incident counts that occurred in zip codes or counties with low average incomes might be compared with counts in zip codes or counties with higher incomes, to see whether the population-adjusted rates differ. Similarly, zip codes or counties can be compared by locations of where clusters of populations and population subgroups live. The major benefit of using the location data is identifying differences when other options are not possible or not successful. For example, income is almost never captured in our data; but frequently, the zip code is present, providing an opportunity for location-based analysis of the CPSC data.

Small-Area Estimation

Small-area measurement methods often can deliver more precise and accurate local-level information than direct estimates in cases where sample sizes are often too small to yield acceptable standard errors. This methodology requires careful validation using in-sample or cross-validation methods (Srebotnjak et al., 2010). CPSC should consider using a small-area estimation strategy that combines data from household surveys, such as the Behavioral Risk Factor Surveillance System (BRFSS), with data from the U.S. Census Bureau and other sources to produce small-area estimates of health

disparities and their determinants (Bilheimer and Klein, 2010). The BRFSS is a health-related telephone survey that collects state data about U.S. residents regarding their health-related risk behaviors, chronic health conditions, and use of prevention services. Small-area estimation is a technique to estimate characteristics (*e.g.*, poverty levels), for small geographic units (counties) without having to undertake large data collections within each unit.

Geospatial Techniques

Geocoding and/or linkage to administrative datasets may also be used to address multidimensional data needs, in addition to their use in identifying disparities, especially by geographic locations. County, zip, and census block level injury rates can be mapped across the United States to represent geographic patterns. Researchers have used geocoding to explore population disparities at different levels of geographic aggregation as an indirect means to identify disparities that reflect modifiable versus innate risk factors (Goovaerts et al., 2007). This can be overlayed with other data and variables of data indexes using social determinates of health datasets and/or U.S. Census American Community data.

U.S. Census American Community Survey

CPSC needs timely, accurate, and customizable information about the populations it protects. The U.S. Census Bureau has a series of quality data products, including the available Decennial Census and the American Community Survey (ACS) data. These data sets can be leveraged for surveillance and to close the gap in CPSC data systems related to race, ethnicity, and socioeconomic status. The ACS is also unique in its ability to produce estimates on a wide range of geographies, including low geographic levels, like census tracts and block groups.

Table 14: Data Variables within the U.S. American Community Survey

POPULATION		HOUSING
SOCIAL	**DEMOGRAPHIC**	Computer & Internet Use
Ancestry	Age	Costs (Mortgage, Taxes, Insurance)
Citizenship	Hispanic Origin	
Citizen Voting Age Pop	Race	Heating Fuel
Disability	Relationship	Home Value
Educational Attainment	Sex	Occupancy
Fertility		Plumbing/Kitchen Facilities
Grandparents	**ECONOMIC**	Structure (Own/Rent)
Language	Class of Worker	Utilities
Marital Status	Commuting	Vehicles
Migration	Employment Status	Year Built/Year Moved In
School Environment	Food Stamps (SNAP)	
Veterans	Health Insurance	
	Hours/Week, Weeks/Year	
	Income	
	Industry & Occupation	

Health Equity Indices

Health Equity indices are a series of characteristic values that measure the exposure of a population to a hazard, providing insights into the potential negative effects on that population as indicators of what may be caused by external factors on health. Table 15 lists four potential Health Equity Indices.

Table 15: Health Equity Indices in Injury Surveillance

Health Equity Index	Description	Scale (where applicable)	Citations
AHRQ Social Determinants of Health Beat Data Files	With funding from the Patient-Centered Outcomes Research Trust Fund, AHRQ has created multi-year (2009–2018) social determinants of health data files correspond to five key SDOH domains		Agency for Healthcare Research and Quality, 2022
Area Deprivation Index	Assesses a region's socioeconomic conditions to identify areas that have high levels of deprivation and may be more vulnerable to adverse health outcomes	Geographic percentile ranking range from 1-10; high score = more highly disadvantaged	Srivastava et. al 2022; Hu et al., 2018; Fairfield et al., 2020
Community Resilience Estimate (CRE)	Uses three different data sources (Community Resilience Estimates, American Community Survey, and Census Bureau Planning Database) to provide information about the capacity of communities and neighborhoods in the United States to respond to the impacts of disasters	CREs are categorized into three groups: 0 risks 1-2 risks 3 plus risks	U.S. Census Bureau
Social Vulnerability Index	Uses U.S. Census Bureau data to assess the extent to which communities are socially vulnerable to disasters, by ranking each census tract on 15 social factors, including poverty, and grouping into four related themes	Values range from 0-1; higher value = higher level of vulnerability	CDC ATSDR, 2011; Srivastava et al., 2022; U.S. Census Bureau

Lennon, N. H., Carmichael, A. E., & Qualters, J. R. (2022). Health equity guiding frameworks and indices in injury: A review of the literature. *Journal of Safety Research.*

CPSC Equity Action Plan

There are many multilayered factors impacting the equity of consumer product safety and injury prevention in the United States. CPSC was among the more than 90 federal agencies across the federal government to conduct an equity assessment, submitting an Equity Plan to OMB, as mandated by Executive Order 13985 - *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government.* In these types of policy discussions, there is a tendency to default to equality.

CPSC conducted an equity assessment to develop an Agency Equity Action Plan outlining specific actions, metrics, and accountability efforts. On January 20, 2022, the agency published its Equity Action Plan, which lays out the challenges and barriers to achieving equitable public health outcomes regarding product safety. The plan details the steps the agency has already taken, and those it will take in the future, to address the identified barriers. Included in the CPSC's Equity Action Plan are efforts to improve the quality of the agency's data collection systems so that CPSC improves its ability to capture information on race, ethnicity, and gender. These improvements to our data collection systems will improve our ability to engage impacted communities to communicate product safety hazards, target safety education campaigns, and gather information, feedback, and new research to learn more about the product safety-related challenges faced by underserved (vulnerable) communities.

The Equity Plan reported CPSC data show Blacks or African Americans are at higher risk of death from generator-related, carbon monoxide poisoning, pool and spa drowning, and residential fires. Black Americans accounted for 22 percent of generator-related CO deaths between 2009 and 2019. That's nearly double the Black American population of the United States, which is estimated to be 13 percent. Black American children ages 5 to 19 years old drown in swimming pools at rates 5.5 times higher than White children of the same age. Ten times more Black children ages 11 to 12 years old drown in swimming pools compared to White children of the same age. According to CPSC's latest Residential Fire Loss Estimates report, Black Americans represent 13 percent of the U.S. population; however, they make up 24 percent of the home fire deaths and 27 percent of the injuries. Research across all races shows that Black Americans have the highest rate of deaths and injuries due to fires—nearly twice the overall death rate, and more than twice the overall injury rate.

CPSC will continue to track trends in the racial disparities in annual reports of injuries to see if our messaging is having an impact across the targeted communities. Reductions in injury rate disparities in the regions and populations we target should be evident in a about 5 years. Success will result in a statistically significant decrease in disparities in racial and ethnicity or other demographic populations.

Collaboration, Coordinated Action, and Communication

CPSC engages and educates America's diverse populations, striving to communicate well and often to keep Americans safe from dangerous consumer products. CPSC is an established and trusted source of education and awareness for consumers from different social, economic, and cultural backgrounds. The CPSC's Office of Communication and other CPSC staff, including the Office of the Executive Director, Office of Outreach, interact with stakeholders from legislators, regulators, manufacturers, industry partners, to name a few. CPSC continues to embed culturally competent outreach, engagement, and evidence-based practices while acknowledging beliefs, biases, and behaviors associated with societal, environmental, and cultural factors. The CPSC State and Local Programs partner with state and local organizations to expand the reach of the CPSC to consumers across the country to promote consumer protection. The State and Local Programs team supports CPSC's safety education programs, collaborating with the Office of Communication on messaging, to speak with one voice.

CPSC recognizes that diverse audiences have different needs and adapts methods of awareness, outreach, and communication to fit the needs with awareness, empathy, and sensitivity. There are also opportunities for consumers to participate in the product identification process of potential defects and hazards of products on the market with Saferproducts.gov. When behavior change is warranted, it is important that CPSC uses narrative storytelling, for example, developing videos and social media content to finding ways to capture the attention of the public with a storyline built around all ranges of emotion, tragedies, trauma, and triumphs with compelling communication to drive home the impact of at-risk behaviors.

CPSC must continue to be committed to reducing barriers to understanding protective and risk factors. Here again, the CPSC can leverage the U.S. HHS's national, federal strategy for health promotion and disease prevention. In addition to national adoption, the U.S. HHS Healthy People Initiative has been adopted at state, local, and community levels to help guide their health-related policy and programmatic agendas. In the area of health communication, a goal for Healthy People is to improve health communication "so that people can easily understand and act on health information" in the areas of personal health and organizational literacy. These are defined by the Healthy People initiative, as:

- Organizational health literacy is the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.
- Personal health literacy is the degree to which individual can find, understand, and use information and services to inform health-related decisions and actions for themselves and others.

Summary

This report emphasizes the importance of a public health approach to consumer product safety. It captured current and historic efforts by CPSC to address consumer safety equity issues and opportunities, and integrates current insights from across a range of epidemiological reports. The report provides status information on the demographic information, race, and ethnicity data in CPSC data systems and the progress of the data imputation study. It concluded with opportunities for further improvements. The current modernization effort has upgraded the CPSC architecture. CPSC will continue to build out the cloud-computing environment and data lake. Funding for a cloud-computing environment, including technical support for migration and maintenance, is critical to this effort. Applying data analytical methodologies and modeling in injury surveillance and research can help with identifying hazard patterns in populations in addition to gain insights into the multifaceted dimensions associated with consumer safety.

It is important to understand how social determinates of health can influence consumer safety especially within vulnerable populations. CPSC will continue to leverage the national agenda of U.S. HHS Healthy People 2030, evidence-based practices, and collaborations with other organizations, institutions, and agencies.

The EXHR will continue actively to seek opportunities to identify and evaluate consumer safety equity issues and allocate safety work toward equity in consumer product safety. The EXHR Directorate for Epidemiology and the EXHR Risk Management Group will continue to look at trends in hazard patterns and to help identify methods and projects to support these efforts.

Recommendations

We recommend continuing several key data initiatives undertaken in the last 2 years to improve our data quality with the goal of capturing race, ethnicity, and socioeconomic data through our existing data systems. These initiatives are critical to CPSC's success in achieving the data goals set out in the CPSC Equity Action Plan and improving consumer safety:

- CPSC should continue to invest in cloud-based technology, data analytics, and human capital.
- Improve death certificate data available to CPSC to make it usable for machine learning algorithms by getting access to U.S. HHS databases or acquiring data from states and localities in computer readable formats.
- Increase outreach to NIESS hospitals not reporting race/ethnicity information on the importance of including this information in the medical records and sharing it with CPSC.
- Use data mining to obtain more information from In-Depth Investigations on underserved populations that may be included in narratives.
- Use alternative data sources and apply different population study techniques to uncover hazard patterns unique to populations and population subgroups.

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